AQUEOUS AMMONIA STRIPPING TECHNOLOGY FOR SCR APPLICATIONS

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SUMMARY

Community, plant safety and regulatory considerations have prompted many Selective Catalytic Reduction (SCR) installation owners to choose aqueous ammonia as their reagent despite higher shipping, storage and vaporization costs. However, a proven technology, a significantly less expensive alternative has largely been overlooked. Ammonia stripping separates ammonia from the aqueous solution based upon the component differences in boiling point or vapor pressures. Ammonia stripping is commonly used in refinery applications. Known as sour water stripping, the process separates H_2S and NH_3 from wastewater generated by the crude sweetening process.

An Ammonia Stripper column (or tower) removes essentially all of the ammonia from aqueous feed as ammonia vapor at the top of the tower and hot water of very low ammonia concentration (10 ppm or less) at the bottom of the tower. Large differences in the vapor pressures of ammonia and water allow high separation efficiency to be economical. The stripper system significantly reduces the energy consumption required to supply ammonia vapor, by not vaporizing the substantial amount of water in the aqueous ammonia stream. Further, some of the heat from the stripper bottoms (discharge water) may be recovered in a feed/bottoms exchanger so that the ammonia stripper bottoms temperature is acceptable for discharge as treated wastewater.

A simple heat balance demonstrates the theoretical operating advantage of the concept, but strippers may be regarded as new or uncommon technology in the power generation sector. But in fact, ammonia strippers have been used in various industries for more than 25 years. Hence, tower designs are well established, including highly refined commercial packing and packed tower simulation models. Furthermore, because support equipment and monitoring instrumentation is common across industries, no unusual or exotic devices are required.

Considering typical utility applications where high ammonia demand is likely and where aqueous ammonia is preferred, the continuous power demand for a vaporizing system may become quite excessive. In these SCR applications, applying an ammonia stripper

may result in substantial savings - not only in decreased parasitic power demand, but also in the cost of the ammonia supply equipment and the associated support equipment without incurring significant new risk in process or equipment.

Nevertheless, a conventional vaporizing system may be well considered in certain situations where a small ammonia demand is required, or an alternative vaporizing source is available. Here, the simplicity of a conventional vaporizer may be preferred. However, such systems are not always practical, particularly in coal fired boilers, with characteristically high ammonia demands.

This paper describes an approach to more efficiently provide ammonia for the SCR application. Foster Wheeler (FW) field experience from the refining and petrochemical industry illustrates the reliability of this technology on improving a contemporaneous process.